IN THE CLAIMS:

Claims 1 to 50 (cancelled)

Claim 51 (currently amended) A composition comprising ~~combination of~~:

(i) at least one polymer in ~~an aqueous solution~~ water-based solvent which is capable of undergoing a transition that results in an at least two-fold increase in its viscosity, said at least one polymer being characterized by at least one of the following features:

having a viscosity at body temperature which is higher than 22,000 Pas following said transition;

~~having a molecular weight higher than 17,000 Daltons;~~

comprising a block copolymer having more than three blocks;

~~having a polymer degradation time generally similar to the time required for de novo chondrogenisis and osteogenesis;~~ and

capable of undergoing a condensation reaction in the presence of water resulting in an increase in the molecular weight of the polymeric system; ~~and~~

(ii) bone marrow cells (BMC); and

(iii) at least one of ~~a source of Mesenchymal stem cells and at least one of~~ demineralized bone matrix (DBM) and, demineralized tooth matrix (DTM) ~~bone morphogenic protein and bone morphogenic growth factor~~.

Claim 52. (currently amended) A ~~combination~~ composition according to claim 51, ~~and~~ wherein said composition further comprises ~~combination includes both said source~~

~~of Mesenchymal stem cells and said at least oen of demineralized bone matrix, demineralized tooth matrix, bone morphogenic protein and~~ bone morphogenetic ~~morphogenic~~ growth factor (BMP).

Claims 53 and 54 (cancelled)

Claim 55 (currently amended) A ~~combination~~ composition according to claim 51, ~~and~~ wherein said at least one polymer ~~in an aqueous solution~~ is capable of undergoing said transition in response to a triggering effect at a body site.

Claim 56. (currently amended) A ~~combination~~ composition according to claim 55 wherein said at least one polymer ~~in an aqueous solution~~ is capable of undergoing said transition in response to said triggering effect which includes a change in at least one of temperature and ~~PH~~ pH.

Claim 57. (currently amended) A ~~combination~~ composition according to claim 52, ~~and~~ wherein said at least one polymer ~~in an aqueous solution~~ is capable of undergoing said transition in response to a triggering effect at a body site.

Claim 58. (currently amended) A ~~combination~~ composition according to claim 57, ~~and~~ wherein said at least one polymer ~~in an aqueous solution~~ is capable of undergoing said transition in response to said triggering effect which includes a change in at least one of temperature and ~~PH~~ pH.

Claims 59 to 62 (cancelled)

Claim 63. (currently amended) A ~~combination~~ composition according to claim 51, ~~and~~ wherein said at least one polymer ~~in an aqueous solution~~ is characterized in having a viscosity at body temperature which is higher than 22,000 Pas following said transition.

Claims 64 to 66 (cancelled)

Claim 67. (currently amended) A ~~combination~~ composition according to claim 51, ~~and~~ wherein:

~~said combination includes said source of Mesenchymal stem cells;~~

~~said source of Mesenchymal stem cells is bone marrow;~~

~~said combination also includes said demineralized bone matrix;~~

said at least one polymer ~~in an aqueous solution~~ is a segmented block copolymer exhibiting reverse thermo gelating properties (RTG) and comprising polyethylene oxide (PEO) and polypropylene oxide (PPO) chains;

said chains ~~are~~ being connected via a chain extender; and

said chain extender ~~is~~ being phosgene.

Claim 68. (currently amended) A method for regenerating musculoskeletal tissue, said ~~other than bone, the~~ method comprising:

~~forming a combination of~~ providing a composition comprising at least one polymer in ~~an aqueous solution~~ a water-based solvent which is capable of undergoing a

transition that results in an at least two fold increase in its viscosity, bone marrow cells (BMC) and one of demineralized bone matrix (DBM) or demineralized tooth matrix (DTM) ~~and a source of Mesenchymal stem cells~~; and

thereafter applying the ~~combination~~ composition to existing musculoskeletal tissue.

Claim 69 (cancelled)

Claim 70. (currently amended) A method according to claim ~~69~~ 68, wherein said transition takes place in response to a triggering effect at a body site.

Claim 71. (currently amended) A method according to claim 70, ~~and~~ wherein said transition takes place in response to said triggering effect which includes a change in at least one of temperature and pH ~~PH~~.

Claims 72 to 80 (cancelled)

Claim 81. (new) A composition according to claim 58, further comprising at least one additional biomolecule to be delivered into the body selected from the group consisting of elastin, collagenous material, albumin, a fibrinous material, growth factors, enzymes, an immunosuppressant, an immunomodulator, an antibiotic, an anti-inflammatory agent and a hormone.

Claim 82. (new) A composition according to claim 58, wherein said at least one

polymer is a reverse thermo-gelating (RTG) polymer, said polymer being a random [-PEG6000-O-CO-$(CH_2)_4$-CO-O-PPG3000-]$_n$ poly(ether-ester) or an alternating [-PEG6000-O-CO-O-PPG3000-]$_n$ poly(ether-carbonate).

Claim 83. (new) A composition according to claim 58, wherein the number of bone marrow cells in the composition is from about 10^6 to $4x10^{10}$ cells/ml.

Claim 84. (new) The composition according to claim 58, wherein the DBM is of vertebrate origin, preferably of human origin.

Claim 85. (new) The composition according to claim 58, wherein the DBM is in powder, particles, string or sliced form.

Claim 86. (new) The composition according to claim 85, wherein said DMB is in powder or particle form, wherein the particle size of the DBM is about 50 to 2500μ, preferably about 250 to 500μ.

Claim 87. (new) The composition according to claim 58, wherein the ratio between BMC and DBM is between 1:1 and 20:1 (volume:volume), preferably between 2:1 and 9:1 (volume:volume), particularly 4:1 (volume:volume).

Claim 88. (new) A composition comprising bone marrow cells (BMC), and demineralized bone matrix (DBM) or demineralized tooth matrix (DTM), together with a site-responsive reverse thermo-gelating (RTG) polymer optionally further

comprising pharmaceutically acceptable carrier, additive, diluent and/or excipient, wherein said RTG polymer is biodegradable.

Claim 89. (New) The composition according to claim 88, wherein said site-responsive polymer is a polymeric system or RTG polymer comprising at least one silicon-containing reactive group, said at least one group being a mono-, di- or tri-functional group.

Claim 90. (new) The composition according to claim 88, wherein said responsive polymeric system generates a polymer selected from the group consisting of a linear polymer, a graft polymer, a comb polymer, a star-like polymer, a crosslinked polymer and combinations thereof.

Claim 91. (new) The composition according to claim 88, wherein said responsive polymeric system also comprises additional reactive groups selected from the group consisting of hydroxyl, carboxyl, thiol, amine, isocyanate, thioisocyanate and double bond-containing active groups and combinations thereof.

Claim 92. (new) The composition according to claim 88, wherein said responsive polymeric system also comprises a solid component, preferably a biodegradable material.

Claim 93. (new) A composition according to claim 88, wherein the number of bone marrow cells in the composition is from about 10^6 to $4x10^{10}$ cells/ml.

Claim 94. (new) The composition according to claim 88, wherein the DBM is of vertebrate origin, preferably of human origin.

Claim 95. (new) The composition according to claim 88, wherein the DBM is in powder, particles, string or sliced form.

Claim 96. (new) The composition according to claim 95, wherein said DMB is in powder or particle form, wherein the particle size of the DBM is about 50 to 2500μ, preferably about 250 to 500μ.

Claim 97. (new) The composition according to claim 88, wherein the ratio between BMC and DBM is between 1:1 and 20:1 (volume:volume), preferably between 2:1 and 9:1 (volume:volume), particularly 4:1 (volume:volume).

Claim 98. (new) The composition according to claim 88, wherein said composition contains BMC-DBM mixture and RTG polymer at a ratio between 5:1 to 1:5, preferably between 3:1 and 1:2, particularly at a ratio of 2 parts BMC-DBM mixture to 1 part of RTG polymer material in fluid form (volume:volume).

Claim 99. (new) A method for transplantation of a composition comprising BMC with DBM, together with a site-responsive polymer, and optionally further comprising pharmaceutically acceptable carrier or diluent and/or additional active agent/s, into any one of a joint, a cranio-facial-maxillary bone, an alveolar bone of maxilla and mandibula, spine, pelvis and a long bone, or for construction or reconstruction of an

extraskeletal bone, including for mechanical or biological support of artificial implants to a joint or of a joint or to a bone of a subject in need, wherein said method comprises introducing into said joint or bone a composition as defined in claim 88.

Claim 100. (new) The method according to claim 99, wherein said composition is administered non-invasively by a syringe, an arthroscopic procedure or by open surgery into the site of implantation.

Claim 101. (new) A method of treating a damaged joint, post traumatic, inflammatory, autoimmune, infectious or degenerative etiology associated with malformation and/or dysfunction of cartilage and/or subchondral bone in a mammal, preferably a human in need of such treatment, comprising administering into an affected joint or bone of said mammal a composition according to claim 88.

Claim 102. (new) The method according to claim 101, wherein the bone marrow cells comprised in said composition are either allogeneic or said mammal's own.

Claim 103. (new) A non-invasive implantation method for support of implants of joints or other musculoskeletal implants, comprising introducing a graft into a joint or a cranio-facial-maxillary bone of a subject in need, wherein said graft comprises a composition according to claim 88.

Claim 104. (new) A kit for performing transplantation of BMC in admixture with DBM and a site-responsive polymer into any one of a joint, a cranio-facial-maxillary

bone, an alveolar bone of maxilla and mandibula, spine, pelvis and long bones, or for construction or reconstruction of an extraskeletal bone, including for mechanical or biological support of artificial implants to the joint or of the joint or to the bone of a mammal, wherein said kit comprises:

(a) DBM in powder, particle, string or slice form;

(b) a site-responsive polymer;

(c) a bone marrow aspiration needle;

(d) an intra-osseous bone drilling burr;

(e) a needle with a thick lumen for infusion of viscous bone marrow-DBM-site-responsive polymer mixture;

(f) a 2-way lumen connector for simultaneous mixing of BMC with DBM and site-responsive polymer and diluent;

(g) a medium for maintaining BMC;

(h) optionally additional factors stimulating osteogenesis; and

(i) cryogenic means for handling and maintaining BMC or BMC together with DBM.

Claim 105. (new) The kit according to claim 104, optionally further comprising a carrier and/or diluent for the BMC and DBM mixture, and for the site-responsive polymer.